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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/569,548	02/27/2006	Kenzo Maehashi	12480000162US	7724

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EXAMINER	
WONG, EDNA	

ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/569,548	MAEHASHI ET AL.	
	Examiner	Art Unit	
	EDNA WONG	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 May 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) *7 and 8* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6 and 9-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *February 27, 2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Election/Restrictions

Applicant's election of Group **I**, claims **1-6 and 9-18**, in the reply filed on May 7, 2009 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

The requirement is still deemed proper and is therefore made FINAL.

Accordingly, claims **7 and 8** are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 112

Claims **11 and 13** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 11

lines 2-3, recite "wherein *the low-dimensional quantum structures* comprise carbon or boron nitride".

Parent claim 3, lines 2-3, recites "wherein *the low-dimensional quantum structures* comprise nanotubes or nanoparticles".

It appears that the carbon or boron nitride is further limiting the nanotubes or nanoparticles instead of the low-dimensional quantum structures, in addition to. However, the claim language is unclear as to whether it is.

Claim 13

line 2, recites "wherein *the low-dimensional quantum structures* have a single-walled structure".

Parent claim 3, lines 2-3, recites "wherein *the low-dimensional quantum structures* comprise nanotubes or nanoparticles".

It appears that the single-walled structure is further limiting the nanotubes or nanoparticles instead of the low-dimensional quantum structures, in addition to. However, the claim language is unclear as to whether it is.

Claim Rejections - 35 USC § 102/103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims **1-6 and 9-18** are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over **Bokova et al.** ("Laser-Induced Effects in Raman Spectra of Single-Wall Carbon Nanotubes", *Quantum Electronics*

(July 31, 2003), Vol. 33, No. 7, pp. 645-650).

Bokova teaches a structure control method comprising:

irradiating a mixture of nano-scale low-dimensional quantum structures of differing densities of states (= HipCO single-wall carbon nanotubes) with an electromagnetic wave in an oxygen atmosphere (= a cw argon laser at 488.0 nm (2.54 eV), 495 nm (2.50 eV), and 514.5 nm (2.41 eV)) was used both to act on the material *(in air)* and to excite Raman scattering) [page 646, "2. Experimental"].

The low-dimensional quantum structures comprise nanotubes or nanoparticles (= HipCO single-wall carbon nanotubes) [page 646, "2. Experimental"].

The low-dimensional quantum structures comprise carbon or boron nitride (= HipCO single-wall carbon nanotubes) [page 646, "2. Experimental"].

The low-dimensional quantum structures have a single-walled structure (= HipCO single-wall carbon nanotubes) [page 646, "2. Experimental"].

The electromagnetic wave is a laser beam (= a cw argon laser at 488.0 nm (2.54 eV), 495 nm (2.50 eV), and 514.5 nm (2.41 eV)) [page 646, "2. Experimental"].

The method of Bokova differs from the instant invention because Bokova does not disclose the following:

a. *So as to selectively oxidize* a low-dimensional quantum structure of a density of states resonating with the electromagnetic wave, as recited in claim ***1***.

b. Wherein the mixture is irradiated with the electromagnetic wave *so as to*

remove from the mixture the low-dimensional quantum structure of a density of states resonating with the electromagnetic wave, as recited in claim ***2***.

The invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because:

(i) Bokova teaches similar method steps as presently claimed (*i.e., irradiating*). Similar processes can reasonably be expected to yield products which inherently have the same properties. *In re Spada* 15 USPQ 2d 1655 (CAFC 1990); *In re DeBlauwe* 222 USPQ 191; *In re Wiegand* 86 USPQ 155 (CCPA 195).

(ii) The Applicant has a different reason for, or advantage resulting from doing what the prior art relied upon has suggested, it is noted that it is well settled that this is not demonstrative of nonobviousness. *In re Kronig* 190 USPQ 425, 428 (CCPA 1976); *In re Linter* 173 USPQ 560 (CCPA 1972); the prior art motivation or advantage may be different than that of Applicants while still supporting a conclusion of obviousness. *In re Wiseman* 201 USPQ 658 (CCPA 1979); *Ex parte Obiaya* 227 USPQ 58 (Bd. of App. 1985) and MPEP § 2144.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims **1-6 and 9-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Yudasaka et al.** ("Diameter-Selective Removal of Single-Wall Carbon Nanotubes Through Light-Assisted Oxidation", *Chemical Physics Letters* (June 4, 2003), Vol. 374, Issues 1-2, pp. 132-136) in view of **Howard et al.** (US Patent No. 7,396,520 B2) and **Bokova et al.** ("Laser-Induced Effects in Raman Spectra of Single-Wall Carbon Nanotubes", *Quantum Electronics* (July 31, 2003), Vol. 33, No. 7, pp. 645-650).

Yudasaka teaches a structure control method comprising:

irradiating a mixture of nano-scale low-dimensional quantum structures of differing densities of states (= HiPco SWNTs) with an electromagnetic wave (= a 488nm or 515 nm light) in an atmosphere (pages 132-133, "2. Experimental"), so as to selectively oxidize a low-dimensional quantum structure of a density of states resonating with the electromagnetic wave (= these findings indicate that light irradiation may be a useful means of selectively *oxidizing* and removing SWNTs with certain diameters that correspond to a gap energy close to the wavelength of the light used for the irradiation, and that SWNTs having semiconductor-type energy structures can be removed in this way) [page 135, right column, lines 32-38].

The mixture is irradiated with the electromagnetic wave so as to remove from the mixture the low-dimensional quantum structure of a density of states resonating with the electromagnetic wave (= these findings indicate that light irradiation may be a useful means of selectively oxidizing and *removing* SWNTs with certain diameters that correspond to a gap energy close to the wavelength of the light used for the irradiation,

and that SWNTs having semiconductor-type energy structures can be removed in this way) [page 135, right column, lines 32-38].

The low-dimensional quantum structures comprise nanotubes or nanoparticles (= HiPco SWNTs) [pages 132-133, "2. Experimental"].

The low-dimensional quantum structures comprise carbon or boron nitride (= HiPco SWNTs) [pages 132-133, "2. Experimental"].

The low-dimensional quantum structures have a single-walled structure (= HiPco SWNTs) [pages 132-133, "2. Experimental"].

The method of Yudasaka differs from the instant invention because Yudasaka does not disclose the following:

a. Wherein the atmosphere is *an oxygen atmosphere*, as recited in claim ***1***.

Yudasaka teaches a H_2O_2 solution (page 133, left column, lines 18-28).

Howard teaches:

"Oxidant" as it is used here refers to the oxidizing agent fed to the combustor. Once in the combustor the oxidant can be assumed either to participate directly, i.e., as a reactant, in oxidation reactions or it may be converted to other oxidizing species which in turn participate as reactants in oxidation reactions. The most preferred oxidant in fullerenes synthesis by combustion is *molecular oxygen or O_2*, which may be fed as pure O_2, as air, as O_2 mixed with one or more inert gases, as O_2-enriched air, as air partially depleted of its original nitrogen, or in other mixtures. The O_2 may serve as the oxidizing reactant in the combustor or it may be converted to some extent to OH, O, HO_2 , H_2O, CO_2, or other oxygen-containing species which in turn serve as reactants in oxidation reactions. Other oxidants of some interest under certain conditions as feeds for a fullerenes synthesis combustor are *hydrogen peroxide (H_2O_2)*, ozone (O_2), and mixtures of these with an inert gas and/or one or more of the species OH, O, HO_2, H_2O, CO_2, or other oxygen-containing radicals or stable molecules (col. 6, line 56 to col. 7, line 7).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the atmosphere described by Yudasaka with the atmosphere is an oxygen atmosphere because oxygen would have been functionally equivalent as an oxidant in the treatment of nanomaterials as taught by Howard (col. 6, line 56 to col. 7, line 7).

Furthermore, it has been held that the selection of a known material based on its suitability for its intended use supports a prima facie obviousness determination. See MPEP § 2144.06 and § 2144.07.

b. Wherein the electromagnetic wave is a laser beam, as recited in claims ***6 and 15-18***.

Yudasaka teaches that while being mixed with the H_2O_2 solution, the SWNTs were irradiated by a 488 nm light (0.3 mW/cm^2) or 515 nm (0.3 mW/cm^2) [page 133, left column, lines 18-28].

Like Yudasaka, ***Bokova*** teaches the Raman spectra of single-wall carbon nanotubes. Bokova teaches radiation from *a cw argon laser* at 488.0 nm (2.54 eV), 495 nm (2.50 eV), and 514.5 nm (2.41 eV) [page 646, "2. Experimental"].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the light described by Yudasaka with wherein the electromagnetic wave is a laser beam because a cw argon laser would have radiated a 488.0 nm (2.54 eV) or 514.5 nm (2.41 eV) light as taught by Bokova (page 646, "2.

Experimental").

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EDNA WONG whose telephone number is (571) 272-1349. The examiner can normally be reached on Mon-Fri 7:30 am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Edna Wong/
Primary Examiner
Art Unit 1795

EW
July 10, 2009